

## Cherysa P Cortez

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**From:** Jean Helwege <helwege@ucr.edu>  
**Sent:** Thursday, April 19, 2018 10:13 AM  
**To:** Cherysa P Cortez; Xinping Cui; Ana Kafie; Michelle Butler; Dylan Rodríguez  
**Subject:** Proposal for a new program in business analytics  
**Attachments:** Proposal for a Master of Science in Business Analytics April 2018 v2 letters.pdf

Cherysa and Dylan,

The Statistics Department and the Business Department are proposing a new masters of science program in business analytics (MSiBA for short). This will be a self-supporting program with a STEM designation that trains students in statistics and business. The program differs from the existing data science degree (joint between Statistics and BCOE) in that it emphasizes three business topics (marketing, finance and operations) and it does not deal with computer hardware or algorithms.

As you can see from the attached document, we have the approval of the faculty in each department, the approval of their respective ECs, the support of the CNAS and Business deans and the support of the graduate division. We also have letters of support from industry and other universities.

Because the program will be set up as an interdepartmental program, the proposal also includes a set of by-laws for governing the program.

Xinping Cui and I are the proposers of the program. We believe we have completed all the steps necessary before submitting it to the Senate. So at this time we ask the Senate to take up the matter.

Best regards,

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**PROPOSAL FOR AN INTERDEPARTMENTAL  
GRADUATE PROGRAM LEADING TO THE  
MASTER OF SCIENCE IN BUSINESS ANALYTICS**

**University of California Riverside**

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## **GRADUATE DEGREE PROGRAM PROPOSAL**

### **Lead Proposers:**

- The faculty of the School of Business and the A. Gary Anderson Graduate School of Management (AGSM)
- The faculty in the Department of Statistics
- The faculty members in the area of Operations and Supply Chain Management (OSCM)
- The faculty members in the area of Marketing
- The faculty members in the area of Finance
- Jean Helwege
- Xinping Cui

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# **PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS**

## **§ 1.0 INTRODUCTION**

With the availability of more detailed data and the ease with which businesses can use faster and cheaper computers to analyze data, the need for well-trained employees in the area of business analytics (BA) has increased dramatically in recent years. BA overlaps substantially with the area known as data analytics or data science, especially in its emphasis on statistics and software, but it differs in that the focus is on business applications. BA uses data and statistical tools to analyze the potential for increasing revenue, decreasing costs and identifying new profit opportunities.

Many business schools are aware of the demand for graduates of BA programs and see an opportunity to elevate their reputations by offering these degrees. According to Poets & Quants, roughly a third of the top 100 business schools have introduced BA masters programs.<sup>1</sup> While BA can be and is taught at the undergraduate level, by its nature the degree is best structured as a graduate program that allows students to extend and strengthen their knowledge of statistics and business. We expect students entering this program to have completed an undergraduate degree in either a quantitative business major or in statistics. Reflecting this logic, the proposed degree is jointly offered by School of Business and by the Statistics Department.

### **1.1 Aims and Objectives**

The Master of Science in Business Analytics (MSiBA) program will expand the training of students with analytical backgrounds to allow them to apply their skills to business data. Businesses have access to increasingly large amounts of data about their customers, costs, and suppliers and they can use this information to improve operations, increase the yield on marketing programs and understand pricing and financing better, which all are methods of obtaining higher profits. The personnel required to do this work must be well trained in both statistics and business.

The proposed MSiBA offers a rigorous program that allows these students to gain the degree in three quarters. Students will have studied either statistics or a quantitative business discipline as undergraduates and will continue their studies at the master's level by following one of two tracks. The statistics track is for students who majored in one of the business disciplines as undergraduates (finance, operations/supply chain, or marketing) and the business track is for students who majored in statistics as undergraduates. Both tracks culminate in a two-quarter capstone class that applies their understanding of business analytics to a project.

The program will take advantage of existing courses in business and statistics. The main new proposed courses for this degree are a two-quarter sequence of capstone courses that allow students to work on a specific project with data tailored to their individual interests. There is also one new statistics course proposed for the MSiBA degree.

There are several objectives of the program that will benefit UCR, CNAS, and the School of Business. The

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<sup>1</sup> <http://poetsandquants.com/2016/01/18/business-analytics-masters-at-the-top-100-b-schools/>. This site includes links to the top schools with programs.

program offers a degree in a fast-growing area that requires rigorous training. By offering this program, the job placements, average salary and training of UCR alumni increase and this enhances UCR's reputation, as well as that of the Statistics Department and School of Business. In addition, the program aims to attract more high quality students. This is especially helpful for School of Business, which currently mainly trains undergraduates who tend to study aspects of business that rely less on the most quantitative business skills. The program will be especially helpful to the Statistics Department in creating a path for undergraduates. Many of the statistics majors at UCR have excellent training in the general area of statistics, but are ill-prepared to use their skills in business. Another goal is financial security for UCR. As a program offering a professional degree, not only will the MSiBA work as a stand-alone program without requiring support from the state, but it is also expected to be a significant source of revenue for UCR each year. Finally, UCR is currently the UC with the largest number of students studying business. The MSiBA program will enhance that standing further, not just in numbers and breadth of choices, but by helping UCR's reputation as the best UC campus for studying business.

## **1.2 Historical Development of the Field and Departments' Strengths**

Before the advent of the personal computer in the 1980s, students could only be trained in the area of statistical computing on a mainframe, where capacity was limited and undergraduates rarely had access. With cheap computing power and improved statistical functions in Excel, the level of statistical analysis of business data has improved at all levels of higher education over the years. Social media and point of sales systems, and other electronic sources of big data have combined with the higher level of statistical training to lower the cost of analyzing data for the purpose of increasing corporate profits. The first college of business in the U.S. to offer a business analytics degree at the undergraduate, Masters and MBA level was UT Austin in 2010. We expect that students will use increasingly sophisticated methods to analyze the wealth of data available. Therefore, the number of students enrolled in BA degree programs is likely to expand.

The faculty in the School of Business and the professors in Statistics are well-positioned to offer the MSiBA degree. Both sets of professors are highly trained in both statistics and business disciplines and they use business analytic tools in their research on a regular basis.

In the School of Business, the majority of professors do empirical research. Since so many ladder-rank professors use statistical techniques to analyze business data in their research, there are many professors in the school who can teach students how to use statistical analysis to answer business questions. And most of the faculty do empirical analysis with fairly large or very large databases and therefore have the skills to lead students into the area of big data. A smaller fraction of the faculty have taught programming as part of their business courses, while others have assigned homework that incorporates statistical analysis that can be carried out in Excel. The finance area implemented a policy in 2016-17 academic year in the Masters of Finance (MFin) program of providing incentives to students to complete statistical analysis in SAS rather than Excel. The faculty are well-positioned to supervise student projects in the proposed capstone courses.

The Department of Statistics has tremendous expertise in teaching statistics and in teaching statistical computing. Their role in the program is less focused on applications of statistical analysis to business and more teaching the fundamental skills need to analyze data with statistical computing packages. The MFin program has already hired faculty in the Statistics department to teach statistical computing (SAS) that is geared to business professionals, so they are also well-positioned to deliver the relevant course material and train students so that they have the statistical computing and analytical skills needed for the capstone courses.

### **1.3 Timetable**

The School of Business and the Department of Statistics are prepared to launch the program in the fall of 2019. We have conservatively projected enrollments at 15 students in the first year and gradually increasing to a projected maximum of 50 students by the fifth year. As a comparison, Arizona State University currently offers a 9-month masters of business analytics degree with 153 students enrolled.

The program requires three new courses, while the remainder of the program uses courses that are already in place. Two of the new courses are capstone courses that will be offered in Winter 2020 and Spring 2020 and the third is a statistics course. These courses have already been submitted by the School of Business and the Department of Statistics for approval by the relevant parties in the shared governance process.

### **1.4 Relation to Existing Programs and Campus Academic Plan**

The program fits the overall strategic plans of UCR, the School of Business and CNAS to increase the university and the schools' presence and reputation. The program helps on a number of fronts: it is more rigorous and technical than some other professional degree programs; it will attract students with backgrounds that are more quantitative and therefore require above average intelligence; the job prospects for students in the program are better than in many other programs, so placement records should help our reputation; and the program can charge a reasonably high tuition to reflect the value-added advantages of this type of education.

The specialized skills taught in the MSiBA program should prepare students well for professional employment. Besides the high demand for business analytics professionals, which should lead to good placements, this program is likely to be recognized by the United State government as a STEM program. Foreign students who graduate from designated STEM programs are allowed to work for extended periods with OPT visas (currently 29 months vs. one year for a regular OPT visa).

The new degree program will rely extensively on existing courses in AGSM and Statistics. This means there will be no immediate need for more faculty and existing faculty can teach the material in existing courses to more students. Students will graduate having taken a common set of classes for most of the program but will be given a chance to apply their skills to a particular area in business, such as marketing, operations, or finance.

Faculty hired in response to growth of the program will help build critical mass in the school, and help to advance the school's research mission. Students admitted to the MSiBA program will be strong quantitatively and will contribute positively to the classroom experience. MSiBA may also draw from the more quantitatively-oriented students in UCR undergraduate programs. If they are successful in completing this program and working in business analytics careers, the program may eventually help draw better students to our existing undergraduate programs in statistics and quantitative business disciplines.

Another advantage of the program is that it should gain in popularity compared to the traditional MBA. Business schools around the country are experiencing declining enrollments in full-time MBA programs. AGSM is no exception to this problem, and thus the number of students in a section is smaller than capacity and there are few electives that are offered more than once a year. By offering marketing, finance and operations courses to students in a growing field, UCR expands its opportunities to use more of its graduate business training capacity.

The program is distinctly different from the existing UCR program in Data Science, which is an online program jointly offered by Statistics and BCOE. By having the Statistics Department involved in both programs, the faculty can monitor the two programs to make sure that one is not cannibalizing the other. The Data Science degree is

designed to focus on the computing and database management. It does not involve strategies to maximize revenue, minimize cost or otherwise improve specific business applications.

### **1.5 Interrelationships with the Programs of Other Institutions, Market and Competition**

A few other UC schools and Cal State universities offer BA programs but most do not. UC Davis and UC San Diego have one year masters degrees. Cal State East Bay has a nine-month program. UCLA will begin its program in Fall 2018. UC Berkeley and UC Irvine have online certificate programs. Cal State LA also has a certificate program but it is so new that no details are listed on its website.

TFE Times ranks business masters of business analytics programs and the only ranked program in California is USC (ranked #1). Outside of California there are several hundred schools that offer BA programs, although the TFE Times list only ranks the top 30 or so. Most programs are for a year of full-time study or less. Our proposal is for a nine-month program that allows students to graduate in spring, which puts them in a good position for the job market. Several programs that go longer than nine months do not have more units than what is proposed for UCR, but instead reduce the course load in some quarters and add one or two courses in the summer. For example, the number of courses in UCSD's business analytics program is the same as the one proposed here except that UCSD has two 1-unit professional development courses. Several nine-month programs are ranked high on the TFE Times list – for example, Arizona State (#5), Southern Methodist University (#18) - and many others are for 10 or 11 months (e.g, #4 Rochester and #6 UT Austin).

In addition, there are many other schools that offer data analytics or computer science programs, but these do not focus on business and are not in direct competition.

### **1.6 Administration**

The interdepartmental program will be administered by two departments, Statistics and Business. Because the program is joint between two departments, the program requires its own set of by-laws. These are included in Exhibit IX. The two departments will have equal control over the program and will split the revenues and costs in proportion to their teaching contributions and recruiting successes. The financial elements of the program are to be determined by the deans of CNAS and Business, with input from the co-directors of the program.

Business and Statistics will establish a joint admissions committee. Admissions will be determined using a process that is similar to that which is currently used for the MBA program. The admissions committee members will collaborate to work on admissions criteria.

The program will be marketed on the Statistics and AGSM websites, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever School of Business decides to participate in such forums for the purpose of MBA recruiting.

Formal student advising will be administered through faculty-led advising/information sessions. Because students are expected to have either an undergraduate statistics or business degree, some separate advising will occur based on previous training. In these situations, students with business degrees will receive advising from the Statistics Department and students with statistics degrees will be advised by AGSM staff.

### **1.7 Plan for Evaluation**

AGSM and Statistics will continuously evaluate the program based on the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alumni.



Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

## **§ 2.0 PROGRAM**

### **2.1 Undergraduate Preparation for Admission**

The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses. Students who have weaker statistical training but otherwise show promise are required to take STAT 171 or similar courses before entering the program.

Because of the need to communicate the results of the analysis, such as that completed in the two-quarter capstone class, strong English skills are also required. The admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency. Preference will be given to applicants who have worked in industry for two or more years.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction.

Additionally each applicant must submit at least one letter of recommendation. The admissions committee will determine in time whether additional letters are appropriate. All other application requirements are specified in the graduate application or in the General UCR catalog.

### **2.2 Foreign Language**

The program has no foreign language requirement.

### **2.3 Program of Study**

#### **2.3.A Fields of emphasis**

The MSiBA core specific field of emphasis is Business Analytics. Within this field, students can do a concentration in either operations, finance or marketing.

#### **2.3. B Plan(s)**

**Plan I (Thesis)** will not be an option for the Master of Science Business Analytics program. Given this is a three quarter (9 months) program, a Plan I (Thesis) option will not be feasible for students.

**Plan II (Comprehensive Examination)** will be the format for the MSiBA degree. In addition to the course requirements associated with Plan II set forth by the Graduate Division (i.e, at least 18 units must be in graduate level courses taken at a UC campus), every candidate must take a comprehensive examination. The comprehensive exam will be determined by the faculty involved in teaching the MSiBA students.

### **2.3. C Unit requirements**

The Master of Science in Business Analytics will be offered as a three-quarter program (48 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

### **2.3. D Required and recommended courses**

All students in the program are required to take three courses (12 units) that focus on analytical tools for business. In addition, students must take a two-quarter capstone sequence (8 units) in which they complete a project that uses the tools acquired in the area of business analytics. These five courses are required for all students in the program. Another set of four required courses (16 units) is designed to enhance their previous training as undergraduates and these vary with a student's undergraduate major. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in both statistics and business. Students who have double majored are treated as if they majored in statistics as undergraduates. The remaining 12 units (3 courses) are elective courses that allow students to concentrate in a particular area of business. The three elective tracks are marketing, operations and finance. Descriptions of the courses are included in Exhibit I.

#### ***Required courses for all MSiBA students***

- MGT 286A-B Capstone in Business Analytics (2 quarter course) **NEW**
- MGT 256 Business Analytics for Management
- STAT 208 Statistical Data Mining
- STAT 232 Statistics for Business Analytics **NEW**

#### ***Required courses for students with an undergraduate business degree***

- STAT 205 Discrete Data Analysis
- STAT 206 Statistical Computing
- MGT 233 Marketing Research
- MGT 267 Applied Business Forecasting

#### ***Required courses for students with an undergraduate statistics degree***

- MGT 202 Financial Management
- MGT 204 Cost and Management Accounting
- MGT 207 Operations Management for Competitive Advantage
- MGT 209 Marketing Management

#### ***Electives – Choose a group of three from below***

- MGT 221 Decision Making Under Uncertainty
- MGT 258 Logistics and Supply Chain Management
- MGT 239 Simulation for Business

Or

- MGT 228 or MGT 257      Consumer Behavior or Marketing Strategy
- MGT 253                      Internet Marketing
- MGT 251                      Market Assessment

Or

- MGT 252 or MGT 295F      Investments and Portfolio Management or Empirical Methods in Finance
- MGT 232                      Derivatives
- MGT 244 or MGT 227      Corporate Risk Management or Fixed Income

All but three courses, MGT 286A-B and STAT 232, are existing courses and have been offered in at least one of the last two academic years. Exhibit I contains a copy of the catalog entries for the existing courses. Given current MBA enrollments, there is sufficient capacity in the existing classes to accommodate the needs of the MSiBA students. Over time, if the programs expand, it may be necessary to offer multiple sections of the courses. Upon approval of the program, the new courses will be offered at least annually and will require staffing. The cluster hire search in business analytics should be sufficient to meet the additional staffing needs in AGSM. The Statistics Department is confident that it currently has the personnel needed to offer new courses required for the program.

## **2.4 Sample Program (full time)**

Below are two sample programs. The first is for a student whose undergraduate training is in statistics and who has chosen to focus on operations. The second is for one whose undergraduate training is in business and has decided to continue with marketing.

### Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

- MGT 256      Business Analytics for Management
- MGT 207      Operations Management for Competitive Advantage
- MGT 202      Financial Management
- STAT 232      Statistics for Business Analytics

#### Quarter 2

- MGT 286A      Capstone in Business Analytics I
- MGT 221      Decision Making Under Uncertainty
- MGT 204      Cost and Management Accounting
- MGT 209      Marketing Management

#### Quarter 3

- MGT 286B      Capstone in Business Analytics II

- MGT 239      Simulation for Business
- MGT 258      Logistics and Supply Chain Management
- STAT 208      Statistical Data Mining Methods

#### Sample Program II (Student has a B.S. or B.A. in Business)

##### Quarter 1

- STAT 206      Statistical Computing
- STAT 205      Discrete Data Analysis
- MGT 256      Business Analytics for Management
- STAT 232      Statistics for Business Analytics

##### Quarter 2

- MGT 257      Marketing Strategy
- MGT 286A      Capstone in Business Analytics I
- MGT 253      Internet Marketing
- MGT 233      Marketing Research

##### Quarter 3

- MGT 286B      Capstone in Business Analytics II
- MGT 251      Market Assessment
- MGT 267      Applied Business Forecasting
- STAT 208      Statistical Data Mining Methods

## **2.5      Certifications**

The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree.

## **2.6      Normative time from matriculation to degree (full-time)**

Plan II students should be able to complete the coursework for this program three quarters (9 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, all of which must be spent at the Riverside campus.

Only courses in which grades of B- or above or "S" are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal

when

1. They have 12 or more units of “I” grades (incomplete course work) outstanding
2. The quarterly GPA falls below 3.00 for two consecutive quarters
3. They fail to fulfill program requirements in a timely and satisfactory manner, or
4. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

### § 3.0 PROJECTED NEED

#### 3.1 Student Demand for the Program

The demand is large and increasing, as attested below:

- The Wall Street Journal says: *“B-school students can’t get enough of big data. Neither can recruiters. Interest in specialized, one-year master’s programs in business analytics, the discipline of using data to explore and solve business problems, has increased lately, prompting at least five business schools to roll out stand-alone programs in the past two years. The growing interest in analytics comes amid a broader shift in students’ ambitions. No longer content with jobs at big financial and consulting firms, the most plum jobs for B-school grads are now in technology or in roles that combine business skills with data acumen, say school administrators.”*<sup>2</sup>
- Robert Half, an internationally recognized recruiting firm, surveyed CFOs and found that 61 percent considered business analytics mandatory for some or all of their accounting and finance employees.<sup>3</sup>
- Poets & Quants, the MBA-focused website, reports that *“business schools have rolled out...[business analytics]...programs, in response to fast-rising demand for workers trained to wrangle and analyze the big data streams that are getting bigger by the second.”*<sup>4</sup>

Business schools are creating programs in business analytics at a rapid pace, but, as noted earlier, there are few UC schools with such graduate programs and California is the home state of only one of the ranked programs. Poets & Quants lists all of the top 100 business schools with a business analytics programs and the only ones in California are USC and UC San Diego. Since the Rady School program’s first class entered in fall 2016, it is not yet established. This strong and increasing nationwide demand for graduates of master’s level business analytics programs, combined with an underserved market here in Southern California, offers an opportunity to gain market share and establish a reputation as a leading school in the discipline. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena, will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program. Exhibit II provides information on existing business analytics programs offered in California.

In addition, some programs that are labeled as business analytics programs focus more on data science than on business, which overstates the degree of competition in this space. For example, the program at USC is

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<sup>2</sup> Big Data Gets Master Treatment at B-Schools: The Wall Street Journal, November 5, 2014. <http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y>

<sup>3</sup> How Business Analytics and Other Key Skills Can Boost Your Career, Robert Half Finance and Accounting Blog, November 23, 2015.

<sup>4</sup> Business Analytics Master’s At 100 Top B-Schools, Poets & Quants, January 18, 2016.

offered by the Data Science and Operations (DSO) Department at USC. DSO has 27 tenure-track faculty as well as a dozen clinical professors. Among the tenure-track, 10 are listed as belonging to the area of Statistics, while the rest are either in Operations or Information Systems. The flavor of the program reflects the fact that it is only offered by DSO, not the whole school, and that DSO is in part a statistics department. In particular, their one-year program requires six courses that emphasize statistics and three electives chosen from a list that includes seven statistics or database courses, while only two required course are clearly focused on business. The only business elective is Marketing Analytics and there are no courses that allow a student to apply business analytics specifically to finance or operations. That is, the focus is on data science rather than applications to business.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded business analytics masters programs. UC San Diego charges \$1,058 per credit unit for their 50 credit degree program, for a total tuition of \$52,900. Our program has two fewer units, but is otherwise similar. We believe it would be prudent to charge slightly less, about \$1000 per credit unit, or \$48,000. USC's program started in 2014 with a tuition set at \$47,000 and is currently at \$51,300. Our intent is to develop the MSiBA as a full-time program and we expect that initial enrollments will be of full-time students, but since many of our MBA classes are at night, the program may attract many part-timers as well. Exhibit III includes financial projections associated with the new program.

Evidence from other programs indicates that students with master's degrees are able to command materially higher compensation than undergraduates. Several sources on the internet suggest starting salaries near \$90,000. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Applicants seem to agree - more than 300 people applied for 87 spots in Arizona State's 2014 class.<sup>5</sup> Given that there is a ready market for such students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program themselves.

### **3.2 Opportunities for Placement of Graduates**

According to McKinsey, there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the firm predicts, the US alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the data.<sup>6</sup>

### **3.3 Importance of the Discipline**

Business analytics is highly important to several disciplines, especially operations, marketing and finance. With the recent developments in technology and communications and data-rich environments, business analytics is indispensable for managers in all three areas, as well as for CEOs and CFOs.

### **3.4 Ways in Which the Program Will Meet the Needs of Society**

Graduates of the program will obtain jobs with above average pay that are even higher than the salaries

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<sup>5</sup> Big Data Gets Master Treatment at B-Schools, Wall Street Journal, November 5, 2014.

<sup>6</sup> See [www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation](http://www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation).

obtained with other graduate business degrees. The Master of Science in Business Analytics program will help students in the Inland Empire advance their careers by helping to obtain these desirable positions. The program address an unmet need for graduate business education in Southern California in general. The program will contribute to UCR's reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration and the Department of Statistics maintain financial stability.

Students in the UCR Master of Science in Business Analytics program will acquire the knowledge and tools necessary to effectively manage their organizations. Their understanding of business analytics will help their organizations operate more efficiently. They will understand that effective use of business analytics give businesses a competitive advantage in the marketplace.

### **3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty**

The Master of Science in Business Analytics program fits well with the research strengths of the School of Business and Statistics faculty. Moreover, revenues from the MSiBA program will help to support databases that are important to the research activities of the faculty, will provide competent research assistants, and will help to provide funding for the Ph.D. programs. In addition, by having more students enrolled in graduate level management and statistics courses, faculty are more likely to teach two sections of the same topic. Given the current workload of four sections per year, this makes it more likely that faculty can complete their teaching obligations with two types of courses (two preps), allowing more time for research. This is particularly helpful for younger faculty.

## **§ 4.0 FACULTY**

The faculty members in the School of Business and the Department of Statistics are quantitatively and qualitatively strong. In particular, the OCSM faculty, several of the quantitative marketing researchers, and the finance faculty are well-suited to delivering successful quantitative business courses. The faculty in Statistics are currently delivering not only statistics courses to their students, but the computer and software classes that are required for business analytics. The strength of the faculty for this program is evident from the number of courses that already exist and the fact that only three new courses would be required at UCR. Exhibit X includes the brief biographies of faculty who will teach in the program.

## **§ 5.0 COURSES**

In the first quarter of the Master of Science in Business Analytics program, students will be expected to take core courses in the areas that they did not study as undergraduates. In the second quarter, building onto the fundamentals, students are exposed to more advanced coursework and will focus their studies in one of three business disciplines: Operations, Marketing or Finance. They will also begin the design and data collection work related to their two-quarter capstone class. In the third quarter, students are expected to build on what they learned and complete their individual capstone projects. They will also expand into more detailed work in some topics and finish up required courses outside their main area. Descriptions of the courses are included in Exhibit I.

## **§ 6.0 RESOURCE REQUIREMENTS**

The program is designed to take advantage of existing capacity in the School of Business and CNAS. Both the Statistics and the Business departments have recently expanded their faculty, so no additional resource requirements involve faculty lines. Support staff for recruiting and administering the program are already in place and are expected to have more time given the declining enrollments in MBA programs. The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty. In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are not expected until the program is well established, if at all. Therefore only minimal additional classroom space is required. Students are expected to have their own computers. Most software is already provided to students through a UCR site license, but if new software is needed to analyze data the students are expected to purchase it on their own, in the same way that they are expected to purchase their own books. The students can use data that the School of Business already purchases or they can obtain their own data using their own funds. There is no additional equipment needed for the MSiBA program nor are there any new library acquisitions required for it. The program is likely to add greater pressure on parking, but currently many of the Management courses are taught at night when parking is more plentiful. The School of Business is embarking on a mission to offer more Saturday classes, which will also help alleviate parking pressures.

Most of the courses will be taught by School of Business faculty, with the rest being taught by faculty in the Department of Statistics. The split between the two depends on the backgrounds of the students in the program. If there are more students who studied undergraduate business, Statistics Department will have a greater portion of the MSiBA students in their classes. The more statistics undergrads who apply, the more the work for School of Business faculty. The new capstone course will require FTE faculty, which would be from the School of Business and Statistics (one for each quarter course).

The program is self-sufficient, given the existing courses, and does not require state resources. Indeed, as a stand-alone professional program, it is expected to generate positive financial resources after considering all costs, as shown in Exhibit III.

## **§ 7.0 GRADUATE STUDENT SUPPORT**

The Master of Science in Business Analytic program will offer graduate student support by reserving 10% of the gross fee revenue for student financial aid. As the program grows, the School of Business Development officers will strive to attain donor commitments for scholarships for the Master of Science in Business Analytics graduate students.

In addition to financial aid in the form of tuition reductions, graduate students in the program may serve as readers for undergraduate courses or as research assistants for professors who work on applied statistical research.

## **§ 8.0 GOVERNANCE**

The program will be directed by an interdepartmental group of faculty that will include all of the faculty in AGSM and all of the faculty housed in Statistics. AGSM will have oversight through its Executive Committee. At the same time, CNAS will have oversight through its Executive Committee. Further oversight will be in place with the creation of a new Advisory Board for the program that includes all ladder-rank faculty from the Department of



Statistics and from the OCSM, Marketing and Finance areas of the School of Business. Executives of Southern California firms and UCR alumni with appropriate expertise will be asked to serve on the board as well.

#### **§ 9.0 CHANGES IN SENATE REGULATIONS**

The Master of Science in Business Analytics program will not require any changes in Senate Regulations at the Divisional level or in the Academic Assembly.

## EXHIBIT I COURSE DESCRIPTIONS

### ***Statistics Courses:***

#### **STAT 205 Discrete Data Analysis (4)**

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160A, STAT 160B, STAT 160C or equivalents; or consent of instructor. Contingency tables, log-linear models, information theory models, maximum likelihood estimation, goodness of fit, measures of association, computational procedures.

#### **STAT 206 Statistical Computing (4)**

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160C or consent of the instructor. Topics include statistical programming, simulation studies, smoothing and density estimation, generating random variables, optimization, Monte Carlo methods, Bootstrap, permutation methods, cross-validation.

#### **STAT 208 Statistical Data Mining Methods (4)**

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 201A, STAT 201B, STAT 202A or equivalents; or consent of the instructor. Covers principal data-mining methodologies and applications. Includes Bayes and LDA classifiers, logistic regression and neural network classifiers, support vector classifiers, classification trees, predictive modeling, ridge and lasso regressions, k-mean and Dendrogram clustering methods, business analytics and mining association rules. Features SAS and R programming language.

#### **STAT 232 Statistics for Business Analytics (4) *NEW***

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 023, 100B or equivalent, or consent of the instructor. Covers analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data with applications in business.

#### **MGT 233 Marketing Research (4)**

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

#### **MGT 267 Applied Business Forecasting (4)**

Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

### ***Core Management Courses:***

#### **MGT 202 Financial Management (4)**

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): graduate standing or consent of instructor; MGT 201 (may be taken previously or concurrently), MGT 211 (may be taken previously or concurrently) or equivalents. Provides a foundation in theories of finance. Topics include time

value of money, security valuation, financial institutions, theories of risk measurements, managing a firm's investment decisions, capital structure, and sources of financing for a firm.

#### **MGT 204 Cost and Management Accounting (4)**

Lecture, 3 hours; outside projects, 3 hours. Prerequisite(s): MGT 211 or equivalent. A study of accounting information for managerial planning and control. Topics include managerial applications for product costing, budgeting, and performance evaluation; accounting techniques for modern manufacturing systems; activity-based accounting and cost management; international cost accounting systems; and the behavioral implications of accounting information.

#### **MGT 207 Operations Management for Competitive Advantage (4)**

Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

#### **MGT 209 Marketing Management (4)**

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

### ***Business Analytics Courses:***

#### **MGT 256 Business Analytics for Management (4)**

Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet Management / 332 environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

#### **MGT 286A Capstone in Business Analytics I (4) *NEW***

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will propose a topic of inquiry that will use a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical techniques used to answer questions related to business operations and profitability.

#### **MGT 286B Capstone in Business Analytics II (4) *NEW***

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; MGT 286A or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will work on a project that was initiated in MGT 286A that uses a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical

techniques used to answer questions related to business operations and profitability.

### ***Operations Electives Courses:***

#### **MGT 221 Decision Making Under Uncertainty (4)**

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

#### **MGT 239 Simulation for Business (4)**

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

#### **MGT 258 Logistics and Supply Chain Management (4)**

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

### ***Marketing Electives Courses:***

#### **MGT 228 Consumer Behavior (4)**

Lecture, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. Analyzes why people buy and examines purchase decision processes and outcomes. Studies current models of consumer behavior. Topics include brand equity, customer delight, global marketing, behavior modification, and strategic market analysis.

#### **MGT 251 Market Assessment (4)**

Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines advanced topics in marketing, with emphasis on quantitative tools to aid marketing decision making. Topics include demand and market-share forecasting, conjoint analysis, market segmentation and cluster analysis, brand positioning and competitive market structures, and assessing market response to price, advertising, promotion, distribution, and sales force.

#### **MGT 253 Internet Marketing (4)**

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 209 or consent of instructor. Examines the role of the Internet in an organization's overall marketing framework. Discusses marketing applications of personalization, traffic generation, online search, community, online experience, and other current Internet-enabled marketing techniques. Emphasizes Internet retailing.

**MGT 257 Marketing Strategy (4)**

Seminar, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. A framework is developed for strategic marketing planning. Topics emphasized include market audits and futures research, product-market identification, product portfolio balancing, target market strategy, and integrated marketing program planning. Relies heavily on an extensive computer-based market simulation.

***Finance Electives Courses:*****MGT 227 Fixed Income (4)**

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): MGT 201. Covers analytical techniques related to fixed-income securities. Includes basic analytical tools in fixed-income markets. Topics include relative pricing of fixed-income securities, yield-curve estimation, securities with embedded options, and trading strategies. Utilizes interest rates swaps, mortgage-backed securities, and credit derivatives.

**MGT 232 Derivatives and Asset Pricing (4)**

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Explores the pricing of derivatives-based securities. Covers various topics in derivatives markets. Introduces pricing techniques for forwards, futures, options, swaps, and other derivatives. Utilizes empirical data and financial modeling.

**MGT 244 Corporate Risk Management (4)**

Lecture, 3 hours; written case analyses and reports, 3 hours. Prerequisite(s): MGT 202. Provides an overview of derivative financial instruments. Focuses on the use of derivatives to manage risk in a corporate setting. Utilizes the case-method to develop strategies and policies for managing the risk exposure of an enterprise, as well as to assess the relations between risk management and value creation.

**MGT 252 Investments and Portfolio Management (4)**

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Discusses standard asset pricing models, portfolio theory, and empirical uses of securities data. Addresses pricing in the capital markets and empirical issues in testing asset pricing models. Other topics include risk-adjusted portfolio performance, term structure, bond pricing, and bond portfolio management.

**MGT 295F Empirical Methods in Finance (4)**

Seminar, 3 hours; individual study, 3 hours. Prerequisite(s): ECON 205A or equivalent or consent of instructor; doctoral standing in Management or consent of instructor. Covers econometric approaches to analyzing common problems encountered when conducting empirical research. Focuses on hypothesis testing, specification tests, general methods of moments estimation, the capital asset pricing model, multifactor asset pricing models, event studies, operating performance studies, simultaneous equations models, and endogeneity issues. Demonstrates programming in SAS and/or Gauss.

## EXHIBIT II

### SCHOOLS THAT OFFER BUSINESS ANALYTICS PROGRAMS IN CALIFORNIA

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University	2017 TFE Times Ranking	Location	Program	Length	Tuition
UCLA	Begins Fall 2018	Los Angeles	M.S. in Business Analytics	13 months	\$62,579
USC	1	Los Angeles	M. S. in Business Analytics	18 months	\$58,674
UC San Diego	unranked	San Diego	M. S. in Business Analytics	12 months	\$52,900
UC Davis	unranked	Davis	M. S. in Business Analytics	12 months	\$50,729
Cal State East Bay	unranked	Hayward	M. S. in Business Analytics	9 months	\$26,595
Cal State LA	certificate	Los Angeles	Business Analytics Certificate	9 units	\$6,300
UC Berkeley Extension	certificate	online	Predictive Analytics Certificate	10 units	\$4,000
UC Irvine Extension	certificate	online	Business Analytics Certificate	11 units	\$3,985
Santa Clara University	unranked	Santa Clara	M.S. Business Analytics	15 months	\$55,076

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### EXHIBIT III FINANCIAL PROJECTION

	2019-20	2020-2021	2021-2022	Steady State
<b>Revenues:</b>				
Number of students	15	20	30	50
Total tuition fees (\$48,000 per student)	720,000	960,000	1,440,000	2,400,000
Scholarships	72,000	96,000	144,000	240,000
Total new revenues	648,000	864,000	1,296,000	2,160,000
<b>Expenses:</b>				
Faculty:				
Additional faculty per capstone section	150,000	150,000	150,000	150,000
Number of capstone sections per year	2	2	2	4
Additional faculty for other courses	50,000	50,000	50,000	100,000
Cost of additional faculty	350,000	350,000	350,000	700,000
Additional staff	100,000	100,000	100,000	200,000
Additional expenses related to classroom use (rent, maintenance, etc.)	30,000	30,000	30,000	60,000
Marketing and recruiting	100,000	100,000	100,000	100,000
Total new costs	580,000	580,000	580,000	1,060,000
<b>Net new cash flow:<sup>7</sup></b>	68,000	284,000	716,000	1,100,000

<sup>7</sup> Assumes new sections of existing courses will not be needed because business analytics students will fill remaining seats in these courses. These include the following STAT and MGT courses (with recent excess classroom capacity noted): STAT 205 (12 of 36 seats in Winter 2017); STAT 206 (11 of 30 seats in Fall 2017); STAT 208 (12 of 30 seats in Spring 2017); MGT 202 Financial Management (offered in two quarters each year; 14 of 65 seats and 24 of 70 seats for sections 1 and 2, respectively, in Spring 2017 and 14 of 36 seats in Fall 2017); MGT 203 Economics for Management (1 of 74 seats and all 36 seats for sections 1 and 2, respectively, in Winter 2017); MGT 204 Cost and Management Accounting (29 of 65 seats in Fall 2017); MGT 207 Operations Management for Competitive Advantage (5 of 65 seats and 23 of 70 seats for sections 1 and 2, respectively, in Spring 2017); MGT 209 Marketing Management (6 of 77 seats and 4 of 35 seats for sections 1 and 2, respectively, in Winter 2017); MGT 221 Decision Making Under Uncertainty (all 30 seats filled in Fall 2017 but can be expanded to a larger room); MGT 227 Fixed Income (40 of 75 seats in Spring 2017); MGT 228 Consumer Behavior (8 of 60 seats in Fall 2017); MGT 232 Derivatives and Asset Pricing (7 of 36 seats in Winter 2017); MGT 233 Marketing Research (2 of 36 seats in Winter 2017); MGT 239 Simulation for Business (17 of 36 seats in Spring 2017); MGT 244 Corporate Risk Management (29 of 70 seats in Winter 2017); MGT 251 Market Assessment (6 of 36 seats remain); MGT 252 Investments and Portfolio Management (53 of 70 seats in Spring 2017); MGT 253 Internet Marketing (12 of 36 seats in Spring 2017); MGT 256 Business Analytics for Management (27 of 36 seats in Spring 2017); MGT 257 Marketing Strategy (4); MGT 258 Logistics and Supply Chain Management (10 of 36 seats in Winter 2017); MGT 267 Applied Business Forecasting (24 of 36 in Winter 2017); and MGT 295F Empirical Methods in Finance (1 of 16 seats in Winter 2017)

## **EXHIBIT IV**

### **COURSE SCHEDULE AND COURSES**

#### Sample Program I (student has a B.S. in Statistics)

##### Quarter 1

- MGT 256 Business Analytics for Management
- MGT 207 Operations Management for Competitive Advantage
- MGT 202 Financial Management
- STAT 232 Statistics for Business Analytics

##### Quarter 2

- MGT 286A Capstone in Business Analytics I
- MGT 221 Decision Making Under Uncertainty
- MGT 209 Marketing Management
- MGT 204 Cost and Management Accounting

##### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 239 Simulation for Business
- MGT 258 Logistics and Supply Chain Management
- STAT 208 Statistical Data Mining Methods



## Sample Program II (Student has a B.S. or B.A. in Business)

### Quarter 1

- STAT 206 Statistical Computing
- STAT 205 Discrete Data Analysis
- MGT 256 Business Analytics for Management
- STAT 232 Statistics for Business Analytics

### Quarter 2

- MGT 257 Marketing Strategy
- MGT 286A Capstone in Business Analytics I
- MGT 253 Internet Marketing
- MGT 233 Marketing Research

### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 251 Market Assessment
- STAT 208 Statistical Data Mining Methods
- MGT 267 Applied Business Forecasting

**EXHIBIT V**  
**ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC**

**1. Name of Program:**

Master in Business Analytics

**2. Campus:**

University of California Riverside

**3. Degree/Certificate:**

Master's Degree

**4. CIP Classification: (to be completed by the Office of the President)**

**5. Date to be started:**

September 1, 2018

**6. If modification of existing program, identify that program & explain changes.**

Not Applicable.

**7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?)**

Program Differentiation

There is a large and increasing demand and professional need for specialized masters programs in Business Analytics. Our program is designed to extend the training of students who have already shown an aptitude for quantitative analysis and expands their skill set to sophisticated analytics in operations, marketing and finance. This makes the program focused on the business applications of statistics and quantitative analysis rather than the tools for handling large amounts of data, which is in contrast to the program at UC Davis or the online Data Science degree offered by UCR. An increasing number of schools are offering masters level programs in business analytics, but the only ranked program in our area is that offered by the University of Southern California. Their program is much too small to serve the demands of Southern California and it is tilted towards data science rather than business. UCR will be unique in the UC system in offering a nine month Master of Business Analytics master's degree and will be one of only three UC universities to offer the degree. The program is also unique in that it is joint between Statistics and Business, which ensures rigorous quantitative training while ascertaining that the program coursework differ from the curriculum in a data science program.

**8. Type(s) of students to be served:**

The Master in Business Analytics will be offered as a 9-month program (48 units) for graduates of a baccalaureate degree in either statistics or a quantitative business discipline. The program will extend the training of students along two tracks so that both sets of students will have similar skill sets by the end of the program.

**9. If program is not in current campus academic plan give reasons for proposing program now:**

Computing power and sophistication of software products has evolved to such a degree that there is now an entire new field combining business acumen with statistical analysis. Traditionally, students have focused on business with limited ability to analyze data or have focused on data analytics without much knowledge of its application to business. The demand for this degree is fairly new and UCR would be at the forefront of schools offering the degree. In addition, the regional market is underserved and this program will be an immediate source of net revenue.

**10. If program requires approval of licensure board, what is the status of such approval?** Not Applicable

**11. Please list special features of the program:**

The program has two tracks serving two types of students, depending on their undergraduate studies. This allows all graduates of the program to reach the same level of expertise in business analytics by graduation.

**12. List all courses required:**

The following four courses are required courses for all MSiBA students: MGT 286A-B (Capstone in Business Analytics, a 2 quarter sequence), MGT 256 (Business Analytics for Management), STAT 208 (Statistical Data Mining Methods) and STAT 232 (Statistics for Business Analytics). In addition, students with an undergraduate business degree are required to take STAT 205 (Discrete Data Analysis), STAT 206 (Statistical Computing), MGT 233 (Marketing Research) and MGT 267 (Applied Business Forecasting). Required courses for students with an undergraduate statistics degree are MGT 202 (Financial Management), MGT 204 (Cost and Management Accounting), MGT 207 (Operations Management for Competitive Advantage) and MGT 209 (Marketing Management).

In addition, students are required to take three electives that form a concentration. The electives must be a group of three courses in either operations, marketing or finance.

**15. List any related program offered by the proposing institution and explain relationship.**

We anticipate that the program will help us fill empty seats in the more technical courses offered in the existing MBA program.

**16. Summarize employment prospects for graduates of the proposed program.**

The program will educate individuals for employment in all types of businesses that collect and organize data for the purpose of maximizing profits. These include large industrial firms, financial services firms and consulting businesses. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

**17. Give estimated enrollment for the first 5 years and state basis for estimate.**

We project 15 students in the first year, increasing each year to reach 50 students in about five years.

**18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.**

Exhibit III contains our financial projections. Library Acquisitions, Computing, Facilities and Equipment are considered to be “in-direct costs” and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program. An increase in faculty FTE is shown by the increase in costs allocated to the Business School or Statistics Faculty. There will be only incremental facilities cost as we will use available capacity in existing classrooms, including statistical computing rooms. Over time as the program expands we anticipate having more students and likely a few more sections of that require more classroom space. The incremental rent, equipment and other elements of classroom space are included in the budget. We do not have specific equipment needs for the MSiBA program. Direct costs for the program include marketing and recruiting costs, and additional support staff, and financial aid at 10% of gross revenue.

**19. How and by what agencies will the program be evaluated.**

An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter

**EXHIBIT VI**  
**BYLAWS FOR THE INTERDEPARTMENTAL MASTERS DEGREE**  
**PROGRAM IN BUSINESS ANALYTICS**

**University of California, Riverside**

Masters of Science Degree in Business Analytics (MSiBA) Program Faculty Approval Date: \_\_\_\_\_  
Graduate Council Approval Date: \_\_\_\_\_

**Article I. Objective**

The mission of the Master's of Science in Business Analytics (MSiBA) program is to deliver graduate level courses that will lead to the awarding of a M.S degree that combines business education with training in statistical analysis. This degree program shall be operated in conformance with the rules and procedures of the Graduate Division of the Riverside Campus of University of California. The expectation is that graduates from this program will assume positions in leading companies that have resources to carry out detailed analyses of marketing, operations, and financial data. To achieve this objective, a combination of rigorous coursework in both statistics and the technical areas of business (operations, marketing and finance) will produce students who are capable of analyzing datasets in ways that will enhance company profits.

As an interdepartmental program, the MSiBA program will involve faculty from Statistics and from Business. If in the future, the School of Business were to separate into more than one department the program will involve Statistics and whichever departments house faculty in operations, marketing and finance.

**Article II. Degree Offered by the Program**

The program offers the Master of Science (M.S.) degree (comprehensive examination Plan I).

**Article III. Membership**

**A. Qualifications for Program Faculty Membership**

The program faculty shall consist of persons at the University of California, Riverside, who are ladder-rank faculty in the School of Business and all ladder-rank faculty in the Statistics Department. Other faculty members may teach courses that are required for obtaining the degree, but the administration of the program will be conducted by the above-mentioned faculty.

All program faculty members will have the same full rights and privileges regarding the governance of the program, with the exception of the two Graduate Program Co-Directors. One Co-Director will belong to the School of Business and one from the Department of Statistics. The Co-Director from the School of Business shall be appointed by the school's Executive Committee (EC).

## **Article IV. Organization and Administration**

The administration of the program and its activities will be supervised by the Co-Directors.

### **A. Program Co-Directors**

The Co-Directors are two faculty members; one from the School of Business and one from Statistics. The director from the School of Business must belong to one of the following areas: Finance, SCOM, or Marketing. The Co-Directors are responsible for the overall organization and leadership of the program. The Co-Directors shall serve as the chief officers and spokespersons for the program and shall call and preside over meetings of the program faculty. The Co-Director from the School of Business represents the program at the Business School Dean's meetings while the Co-Director from Statistics represents the program at the CNAS Dean's meetings.

The appointment of the Co-Directors shall be in accordance with the regulations of the UCR Graduate Council. The Co-Directors will be appointed by the Chancellor for a term of three years, upon the recommendation of the Dean of the Graduate Division and the Deans of CNAS and the School of Business. Each respective school's EC shall solicit the names of nominees for a new Co-Director. The Graduate Dean, in consultation with the respective Deans, will forward his/her recommendation to the Chancellor, who makes the appointment.

## **Article V. Committees**

### **A. Admissions and Recruitment Committee**

The members of the Admissions Committee will be selected by the Co-Directors on an annual basis. All members of the Admissions and Recruitment Committee must be program faculty who are AGSM or Statistics Department faculty members. The Admissions and Recruitment Committee shall consist of

- The Graduate Program Co-Directors, who supervise the committee
- Four program faculty that represent as many different major field areas in the program as possible.

The functions of this committee shall include admission of students to the program and recommendations for their financial support. Admissions decisions are made by the Committee with input from the program faculty. The Committee will also be responsible for recruitment strategies, organization of prospective student visits to campus, and appropriate updating of the program website and print brochures.

## **Article VI. Meetings**

At least one annual meeting of the program faculty must be held in the Fall at the beginning of the academic year. Other meetings may be called as frequently and for such purposes as deemed desirable by the Graduate Program Co-Directors. Additional meetings can be scheduled upon written petition by five or more program faculty members (sent to the Co-Directors). Meetings will be conducted according to Robert's Rules of Order. Minutes of the meetings shall be kept by the AGSM or CNAS staff and shall be distributed to all program faculty within ten days of the meeting.

## **Article VII. Quorum**

A quorum consists of 50% of the eligible program faculty. Passage of motions shall require a simple majority of the MSiBA program members who are present at the meeting. Voting may also be done by electronic ballot.

## **Article VIII. Amendments**

Amendments and revisions to the bylaws may be proposed by either the AGSM faculty or the Statistics Department Faculty by petition of 20% or more of the faculty in either department. Proposed amendments shall be either discussed at a meeting which satisfies quorum requirements or distributed by electronic mail to the program faculty members at least one week before distribution of the relevant ballot. Passage of an amendment to the bylaws will require at least a majority of those voting by electronic mail. All amendments and revisions must be submitted to the UCR Graduate Council for review and approval.

**EXHIBIT VII**  
**LETTERS OF SUPPORT FOR THE PROPOSED**  
**MASTERS IN BUSINESS ANALYTICS PROGRAM (MSiBA)**

Exhibit VII includes letters of support from the following individuals:

Professor Sanjiv Das, Co-Director Masters of Business Analytics Program, Santa Clara University

Ms. Payal Shah, UCR Alumna, Ph.D. Statistics

Mr. Jesse Cota, UCR Alumnus, B.A. Business Economics

Mr. Minh Ly, UCR Alumnus, B.S. Statistics

Ms. Tricia Haderlie, School of Business Career Development Center Advisory Board member

Professor Karsten Hansen, Professor of Marketing, UC San Diego

Mr. Jefferson Hammann, Walmart



October 21, 2017.

To: Professor Jean Helwege

Re: UCR Business Analytics Masters Program (MSiBA)

I am writing in support of your MS in Business Analytics proposal. I believe that with less than an additional year of coursework, your undergraduate students with a grounding in subjects such as math, statistics, quantitative business, engineering, etc., would be able to rotate into analytics and graduate with a Masters degree with sufficient training to be employed as entry-level hires in the vast array of Analytics jobs that remain unfilled today. In short, the basic proposition of the degree is well thought out, based on market demand, and satisfies a need in the job market.

I am the William and Janice Terry Professor of Finance and Data Science at Santa Clara University, and previously held appointments as Associate Professor at Harvard and Berkeley. My fields are quantitative finance and theoretical and applied computer science. I work at the interface of both fields, and supervise undergraduate and graduate students in both areas. My CV is available at <http://srdas.github.io/>. I am also a member of the advisory board of MIT's Consortium for Risk Analytics, and a Senior Fellow at the FDIC. I am the founder and co-director of the MS in Business Analytics (MSBA) program at SCU and we are based in the heart of Silicon Valley (Santa Clara county is Silicon Valley), so I am keenly aware of the growing demand for analytics skills.

I believe the goals of the program are differentiated well from other offerings. The key idea is that this program is not meant to produce more "data scientists" — a programmer with data and statistics skills. Data scientists play more technical roles at the intersection of computer science and statistics, but do not have business perspective. There is a greater proportional shortage of people who can ideate business propositions from data. Such people need a solid grounding in economics, finance, marketing, supply chains, where knowledge of business paradigms is key. I believe that the MSiBA will fill a huge gap for "business analysts" in the job market, as opposed to the gap for data scientists. My own estimation is that there are many more jobs for data scientists, which are being filled by software engineers with some coursework in handling data using machine learning. But, even though there are fewer jobs for business analysts, the percentage of these roles being filled is much smaller. This is the niche you are trying to fill and



it is a big opportunity. My own program at SCU is aimed at exactly the same market. We graduated our first cohort and placed them all, and this year we have tripled the size of the program for the cohort beginning in Fall 2017.

When we began our MSBA program, the intention was identical to yours, i.e., track our undergrads into it and enable them to continue on for a value-add degree. We were surprised and overwhelmed by the external demand for the degree, which led us to open it up to an external market. I suspect you may end up doing the same. As many of the major tech names begin to build and extend campuses in the LA region, you will find a natural home for some of your graduates, but the demand from startups is also high, especially for people who are not just programmers, but business thinkers as well. I think the courses you have will serve the students well, and the only course I see that would be useful to add on is a course on machine learning, which is an essential part of the training that analytics students must have.

Your proposal envisages a small initial cohort of 15 students. Your program will change rapidly as you learn from doing with feedback from employers, but I would also give thought to how to scale the program as you will likely be pleasantly surprised by the demand for it. There will be a need for faculty to rotate into teaching a skill set that extends beyond what is currently the provenance of business school education. This is a good challenge to have, and your program will add a new energy to both, your undergraduate and graduate programs. I believe it is a well thought out proposal, and I heartily support it.

Sincerely,

A handwritten signature in dark ink, appearing to read "Srdas", with a short horizontal line underneath.

Sanjiv R. Das | William and Janice Terry Professor of Finance | Leavey School of Business | Santa Clara University | Tel: (408)-554-2776 | [srdas@scu.edu](mailto:srdas@scu.edu) | <http://srdas.github.io/>

November 1, 2017

Kathryn Uhrich  
CNAS Dean's Office  
Geology 2258  
Riverside, CA 92507

Dear Dean Uhrich,

I am writing to offer my support of the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Math and Statistics, M.S. in Statistics, and a PhD in Applied Statistics. Since graduating with my PhD, I have spent the last eight plus years in a career building statistical models to use as a tool in making important business decisions. I currently work in the Consumer Modeling and Analytics team at Bank of America as Senior Vice President, Quantitative Operations Manager.

I believe this program is helpful in preparing students for similar careers. Many people who have extensive training in statistics have little formal training in business. Time must be invested to learn this on the job, while graduates of this program would start the job with more of the relevant skills and training required on the business front as well.

In particular, the Statistics UG track with the finance concentration would really help someone with a strong statistical background who wants to work in a quantitative realm within the financial industry be better prepared. Hence, I truly believe this program will be a great resource and want for students with similar career interests.

Sincerely,



Payal Shah  
[Pshah1122@gmail.com](mailto:Pshah1122@gmail.com)  
(951) 237-3517

Jesse Cota  
Senior Financial Analyst  
Agua Caliente Band of Cahuilla Indians  
[jesse@cota.email](mailto:jesse@cota.email)  
(760) 625-4843

November 20, 2017

University of California Riverside  
Riverside, CA 92521

Honorable Members and Chairs of the different relevant departments:

As a member of the Inland Empire community and an alumnus of UCR, I am honored and enthusiastic in making a case for the one-year Master of Science in Business Analytics (MSiBA) program. I graduated in 2010 with a B.A. degree in Business Economics. My theoretical background was very well cemented, but I found myself lacking the practical skills in business analytics needed to be competitive in the labor market. It was only after a few years in the workforce and after having completed a master's degree from the School of Advanced International Studies at Johns Hopkins University (SAIS) that I began to obtain and improve skills in statistical analysis, econometric methods, data modeling, data management, and business intelligence among others.

Given today's abundance of professionals with bachelor's degrees, being able to differentiate oneself from the many is key. In addition, the current trend of corporations, government agencies, NGOs, and other organizations to make only decisions that are driven by data will continue to increase as server memory and computing power improve. With the proper advice, undergraduate students of accounting, business, economics, finance, statistics and related disciplines may guide their studies toward the goal of being admitted to the MSiBA program and hence make themselves competitive with the right mix in their skillset.

As a professional in the sector of business analytics, I witness on a day-to-day basis the need for better efficiency, analysis, and management of operations data. If more students graduate with the acumen and knowledge on how to treat, extract, transform, load, and analyze data, organizations hiring them will increase their added-value and efficiency. Therefore, I strongly recommend the creation of the one-year MSiBA program to the members and chairs of the different relevant departments within the University of California, Riverside. Should you have any questions, or would like further information, please do not hesitate to contact me at the email or phone number above.

Faithfully yours,  
Jesse Cota

November 3, 2017

Kathryn Uhrich  
CNAS Dean's Office  
Geology 2258  
Riverside, CA 92507

Dear Dean Uhrich,

I am writing to give my support to the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Statistics – Quantitative Management in 2004, and have since then built a career in business operations. I currently work at Gigamon as Senior Manager, Demand Planning.

When I heard about the proposed MSiBA program, in particular, the Statistics UG track with the Operations concentration, I knew this would be a great program for students who are trained in Statistics have a better understanding of business operations. These are both tools that are used daily in my field. I think this will be a great program to prepare people, who are considering similar careers, with the relevant skills.

Best Regards,

A handwritten signature in black ink, appearing to read 'Minh Ly', with a long horizontal flourish extending to the right.

Minh Ly  
Minh.P.Ly@outlook.com  
(909) 382-1618

February 12, 2018

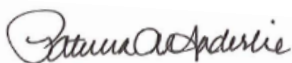
Yunzeng Wang, Ph.D  
Dean, University of California, Riverside School of Business  
Riverside, CA 92521

Dear Dean Wang,

I am writing to offer my support for Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM. Businesses are in need of qualified professionals who have demonstrated their knowledge, skills and abilities by achieving a master's degree in this field.

Our organization is a non-profit and as such, it is vital for us to better understand the large amounts of data we have about our customers, programs, and costs in order to improve our operations and services, especially in a time when grant dollars are not readily available. Over the past two years, our organization had the privilege to host a couple of MBA Fellows; both concentrated on analytics and their work made an impact for us. A program dedicated to this would be instrumental in the non-profit and for profit worlds.

Sincerely,



Tricia Haderlie  
SVP, Talent & Training



RADY SCHOOL OF MANAGEMENT

9500 GILMAN DRIVE #0554  
LA JOLLA, CALIFORNIA 92093-0554  
WEB: [www.rady.ucsd.edu](http://www.rady.ucsd.edu)

Karsten T. Hansen  
Professor of Marketing  
Rady School of Management  
E-mail: [k4hansen@ucsd.edu](mailto:k4hansen@ucsd.edu)  
Phone: (858) 822 7462

February 14, 2018

Yunzeng Wang  
Dean, School of Business  
University of California – Riverside  
Riverside, CA 92521

Re.: Degree proposal of MSiBA program, UC Riverside

Dear Dean Wang,

I am writing to offer my support for a new program in business analytics at UC Riverside. The proposed MS degree in business analytics (MSiBA) program will provide a valuable service to students in the Inland Empire as well as to the businesses that hire them. For reference, my background is 15 years of research in Quantitative Marketing with a specialty in “big data” analytics. Furthermore, my own school at UC San Diego launched a similar MSBA program in 2016 and I am quite familiar with many of the details in setting up a program like the one UC Riverside is proposing.

The MSiBA program is designed to ensure a high level of scholarship by combining the expertise of both statistics and business professors who will teach in this interdepartmental program. The admissions criteria also help ensure a high level of scholarship, as only those students who have already been trained in one of the two areas of study will enter the program. The two quarters of capstone courses also add to my confidence that graduates of this program will be able to apply their training in a real business environment.

The need for students trained in the area of business analytics is large and growing. This is a great opportunity for students from underrepresented groups to obtain professional training that will enhance both the financial aspects and prestige of their future careers. As a university that values the diversity of its undergraduate population, UCR will benefit greatly from extending this environment to its professional schools.

Overall, I think the directors of the proposed program have put together a very clear, detailed presentation of the program proposal and I think they make a convincing case for starting a MSiBA degree program at UCR. In sum, I believe this program will greatly enhance the reputation of UCR, the economy of the Inland Empire, and opportunities for underrepresented groups.

Best,

Karsten T. Hansen

February 22, 2018

Dr. Yunzeng Wang  
Dean, UCR School of Business  
University of California, Riverside  
Riverside, CA 92507

Dear Dean Wang,

From our first meeting in 2014 through my work on the CDC Advisory Board to the A. Gary Anderson Graduate School of Management, I have enjoyed unrivaled academic partnerships and community support, as well as lasting professional relationships and camaraderie which will transcend our formal assignments to our respective institutions. Through our board work, I have recently learned of Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM.

Having worked in corporate supply chain with Walmart for more than 16 years, as well as seven years with various governmental agencies, I would be remiss to not offer support to this proposal. I have taken the opportunity to review the related materials as well as reflect on the applications of such training to professionals in my field. Data analytics applications in complex business problem-solving are at the forefront of my field, and we are always in search of such talent that can leverage continued growth into our business.

Supply chain in general, and the retail sector in particular, are becoming increasingly competitive in an omni-channel world. Such a track of study would certainly have interested me had it been available at the time I pursued masters-level work. I would look forward to seeing this program in implementation and action, particularly with regard to the professionals that will graduate to successful careers in the supply chain space.

My thanks in advance for your consideration.

Sincerely,



Jefferson Hammann  
[jeffersonhammann@gmail.com](mailto:jeffersonhammann@gmail.com)  
951.675.1979 mobile



## **EXHIBIT VIII**

### **BIOGRAPHIES OF SELECTED PARTICIPATING FACULTY**

Exhibit XI includes biographies of the following professors:

*Statistics:*

Xinping Cui, Department Chair and Professor  
James Flegal, Associate Professor  
Daniel Jeske, Professor  
Yehua Li, Professor

*Business:*

Subramanian (Bala) Balanchander, Professor  
Alexander Barinov, Assistant Professor  
Mohsen El Hafsi, Professor  
Long Gao, Associate Professor  
Elodie Goodman, Associate Professor  
Jean Helwege, Professor  
Iva Kalcheva, Assistant Professor  
Charles Zhang, Assistant Professor

#### **Bala Balachander**

Subramanian “Bala” Balachander is Professor and the Albert O. Steffey Chair in Marketing at the School of Business Administration of the University of California, Riverside. Prior to his current position, he was a Professor of Management at Purdue University. Professor Balachander has a Ph. D. in Industrial Administration from Carnegie Mellon University, an MBA from IIM, Calcutta and a B. Tech in Chemical Engineering from IIT, Madras. His research studies competitive marketing strategy, pricing, bundling, sales promotions and market signaling, and uses methods of game theory and structural econometric models. His teaching interests are in pricing, marketing strategy and marketing models. A 2012 study published in the Journal of Product Innovation Management ranked Professor Balachander No. 16 among the world's top innovation management scholars based on articles published in the top marketing journals. Professor Balachander currently teaches MGT 257, Marketing Strategy.

#### **Alexander Barinov**

Dr. Barinov is an Assistant Professor of Finance at A. Gary Anderson School of Business Administration, University of California Riverside. Prior to joining UCR in 2015, he taught at the University of Georgia. He earned his Ph.D. and his M.S. in Finance from the University of Rochester. He also holds a M.A. degree in Economics from New Economic School (Moscow) and a B.A. in Economics from Lomonosov Moscow State University. Dr. Barinov’s work centers

around the idea that firms with high levels of firm-specific uncertainty and option-like equity beat the CAPM when expected aggregate volatility increases, and therefore serve as a hedge against aggregate volatility risk. His work is related to phenomena in the stock market known as the value effect, the small growth anomaly, the new issues puzzle, the idiosyncratic volatility discount and the analyst disagreement effect. Dr. Barinov currently teaches MGT 295G and MGT 252, which focus on investments in the stock market.

## Xinping Cui

Dr. Cui is a Professor of Statistics at the University of California –Riverside, a position she has held since 2014. She joined UCR in 2002, after working as a statistical analyst at Reed Neurological Research Center. Dr. Cui became chair of the Statistics department in 2016. She earned her Ph.D. in biostatistics at UCLA and an M.S. in applied statistics at Bowling Green State University. Dr. Cui's undergraduate degree is in mathematics, which she studied at Nankai University in Tianjin, China. She also has a M.S. degree in math from Nankai University. In addition to receiving grants from the National Institutes of Health to study statistical aspects of health and disease, Dr. Cui has worked with researchers at the UCR Agricultural Experimental Station. She currently teaches STAT 231A, Statistics for Biological Sciences, as well as several undergraduate statistics courses.

## Mohsen El Hafsi

Mohsen Elhafsi received both Ph.D. and M.S. in 1995 in industrial engineering from the University of Florida. He received a "Qualified Engineer" degree from the Ecole Nationale d'Ingenieurs de Tunis, Tunisia, in 1988. Dr. El Hafsi joined the School of Business at UCR as a tenure-track faculty member in 1997. In 2007, he was awarded a \$10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems.

## James Flegal

Dr. Flegal is an Associate Professor of Statistics at the University of California –Riverside. Professor Flegal received his Ph.D. from the University of Minnesota. Dr. Flegal has worked with researchers at NASA in the organization known as FIELDS, or Fellowships and Internships in Extremely Large Data Sets: A Training and Research Program in Big Data and Visualization. His research focuses on Monte Carlo methods and Markov chains. He currently teaches STAT 206, Statistical Computing.

## Long Gao

Dr. Gao is an Associate Professor of Management in the area of Operations and Supply Chain Management at the University of California –Riverside. He earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. Professor Gao currently teaches MGT 239, Simulation for Business and MGT 207, Operations Management for Competitive Advantage.

## Elodie Goodman

Dr. Goodman is an Associate Professor in the area of management science in the School of Business. She joined the University of California – Riverside in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d'Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and healthcare payment systems. She currently teaches MGT 201, Quantitative Analysis and MGT 221, Decision-Making Under Uncertainty.

## Jean Helwege

Dr. is a professor in the Finance area of the School of Business at UC Riverside. Before joining the group, she held the J. Henry Fellers Professorship in Business Administration at the University of South Carolina. Her prior experience also includes faculty positions at Penn State, the University of Arizona, and Ohio State University. From 1988 to 1998 she worked in the Federal Reserve System as an economist. She holds a Ph.D. in economics from UCLA and she received a Bachelor of Arts in linguistics from the University of Chicago. Her research interests include corporate bonds, bank regulation, financial distress, initial public offerings and capital structure. She currently teaches MGT 227, Fixed Income.

## Dan Jeske

Dr. Jeske is a Professor in the Statistics department at the University of California –Riverside, where he has worked since 2003. Prior to joining UCR, Professor Jeske held positions at Rutgers University and Bell Laboratories. He is the editor of *The American Statistician*, and has served on the editorial board of *Applied Stochastic Models in Business and Industry* and *Technometrics*. He earned his Ph.D. and his M.S. degrees in statistics at Iowa State University. Dr. Jeske's undergraduate degree is in mathematics and computer science from Austin Peay State University. Dr. Jeske runs the Statistical Collaboratory Consulting Project at UCR, which has

cumulative revenues of over \$1 million. He currently teaches STAT 208, Statistical Data Mining.

### Ivalina Kalcheva

Dr. Kalcheva is an Assistant Professor of Finance in the School of Business at UCR. She joined the Business department in 2014 after having taught at the University of Arizona from 2007-2014. Professor Kalcheva earned her Ph.D. in Business Administration from the University of Utah. She has an M.B.A. from Saginaw Valley State University and she studied for her B.A. in economics in Bulgaria. Dr. Kalcheva's research focuses on the stock market and trading execution. She has taught MGT 252, Investment and Portfolio Management and MGT 202, Financial Management.

### Yehua Li

Dr. Li is a Professor of Statistics at the University of California –Riverside. Professor Li joined UCR in 2018 after having taught at Iowa State and the University of Georgia. He received his Ph.D. from Texas A&M University in 2006 and his undergraduate degree in applied math from Tsinghua University in Beijing, China. Dr. Li's research interests are in big data, bootstrapping, large sample theory, measurement error and nonparametric approaches. He has statistical methods for electrical engineers and applied experimental design.

### Charles Zhang

Dr. Zhang is an Assistant Professor of Management in the marketing area at the University of California –Riverside. Professor Zhang joined UCR in 2014 after having taught at Boston College. He received his Ph.D. in marketing from the University of Michigan and degrees in statistics from University College, London and Fudan University. Dr. Zhang's research interests are judgment and decision making with an emphasis on numerical judgment and inference. Some of his published work is focused on how the granularity of communicated numbers conveys information that goes beyond the magnitude of the numbers. Professor Zhang currently teaches MGT 233, Marketing Research.



900 University Avenue, Anderson Hall, Riverside, CA, 92521

Tel: 951.827.4237 Fax: 951.827.3970 e-mail: [yunzeng.wang@ucr.edu](mailto:yunzeng.wang@ucr.edu) web-site: <http://soba.ucr.edu>

March 23, 2018

The Graduate Council  
University of California, Riverside  
Riverside, CA 92521

**RE: Master of Arts in Business Analytics**

Dear Committee Members:

I am writing to endorse the proposed Master of Arts in Business Analytics. This is a well-designed program to meet the strong demand from students who has an analytical background and are interested in professional careers in business administration. The program has the potential to significantly differentiate UCR's Business School and to raise the reputation of the School and the Campus. The program will provide a stream of revenue to help improve faculty and student support.

Like the faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang  
Dean

To: CNAS Executive Committee

From: Kathryn Uhrich  
Dean, CNAS



Date: April 12, 2017

RE: Proposal for an Interdepartmental Graduate Program Leading to the Master of Science in Business Analytics

The Department of Statistics along with faculty of the School of Business and the A. Gary Anderson Graduate School of Management have proposed a valuable degree program that allows students to obtain a MS degree in Business Analytics. The degree program will be offered as a three-quarter 48 units program for graduates of a baccalaureate degree that provides sufficient quantitative background to enable successful completion of the program. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in statistics and business. The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree. All but three courses are existing courses and have been offered in at least one of the last two academic years. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields.

I fully support this proposed Master of Science degree program in Business Analytics.

March 28, 2018

To: Dylan Rodriguez, Chair of the Academic Senate  
From: Jerayr Haleblian, School of Business Department Chair  
Re: MSiBA

Dear Dylan,

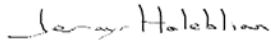
I would like to strongly support the joint effort between the business school and the department of statistics to create a Master of Science in Business Analytics (MSiBA) at UC-Riverside. This program will develop the analytical abilities students and allow them to apply these abilities to business data. A recent trend has emerged in which businesses have access to vast amounts of data. Analyzing such data on customers, competitors, and costs can be used to improve strategy, forecasting, and operations. Programs in Business Analytics are emerging around the country, and are fast becoming the most in demand programs within business school program portfolios.

The UC Riverside School of Business has designed a Business Analytics program that is unique in that it trains its students in both business and statistics by drawing on both the school of Business and Department of Statistics. The resulting program has the potential to offer superior training in appropriate statistical analysis than can typically be offered when programs only reside in the business school.

From the perspective of the business school, we would like to emphasize the following:

1. The business school has sufficient resources to offer the classes in this program. Specifically, the proposed curriculum is based on courses we already offer. The only exceptions are two capstone courses (one in statistics and one in business) and a new statistics course. Accordingly, the business school needs to only staff one new course. Moreover, most of the existing courses that MSiBA students will take already have capacity for additional students. Therefore, the business school currently has the resources required to deliver the program with only minimal additional resource requirements.
2. The program is rigorous, and as a result will enhance the reputation of the business school. The UCR School of Business is currently ranked among the top 100 business schools in the US, and this program will only help enhance this reputation.
3. There is strong demand for business analytics programs across the country, and we fully expect that our program will be in high demand as worldwide businesses continue to move in the direction of increased large data set analyses.

4. The joint set up with the department of statistics gives us a competitive advantage, as we can offer superior data analytic training, which we believe will help sustain the program in the long term.



Jerayr Haleblan  
Department Chair  
School of Business





DEPARTMENT OF STATISTICS  
RIVERSIDE, CALIFORNIA 92521-0138

April 15, 2018

The Graduate Council  
University of California, Riverside  
Riverside, CA 92521

Dear Committee Members:

I am writing in strong support for the proposed inter-departmental Master program in Business Analytics at UCR. Business Analytics has grown out of the need to integrate business and statistical approaches to processing and interpreting business data. It is experiencing a rapid and unplanned growth. The program addresses critical shortage of college graduates trained in business analytics in the industry and government. The proposed program will provide a synergistic approach to real world business problem solving, one that leverages the content in statistics but using case-based focus and hands-on approach. Creating this program will also help differentiate and raise the reputation of UCR's Statistics Department. This self-support program is also expected to generate substantial revenue to help improve the support in students and faculty in Statistics Department.

Our Statistics Department is enthusiastically and fully committed to the establishment and the success of Business Analytics Program at UCR.

Sincerely,

A handwritten signature in cursive script, appearing to read "Xinping Cui".

Dr. Xinping Cui  
Professor and Chair  
Department of Statistics  
University of California, Riverside

April 10, 2018

To Whom It May Concern:

I write in support of the proposed MS in Business Analytics. With more, and more varied types of data available, businesses require professionals skilled and trained within this area. More than ever before businesses need managers and leaders who are able to make decisions informed by data. Graduates from this program will be well-prepared either for a transition to a PhD program in business or to transition to a career in the business world. This latter is especially relevant to our region where skills such as these are in short supply. Graduates from such programs elsewhere in the US are highly sought after. The program at UCR will contribute to the reputation of AGSM as a school of innovation in business learning. The proposed program builds on existing expertise within the school and is both rigorous and well-thought out and will provide students with the combination of analytical and technical skills necessary to succeed in this area.

Sincerely,

A handwritten signature in black ink that reads "Shaun Bowler".

Shaun Bowler  
Dean of the Graduate Division